

# Effects of BPM on ERP Adoption in the Public Sector

*Full Paper*

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## Abstract

The study examines how Business Process Management (BPM) affects the Enterprise Resource Planning (ERP) adoption in the public sector with regard to the three main phases: planning, implementation, and post-implementation of the system. The research method is a multiple case study with data collection using mainly semi-structure interviews with internal ERP users. The units of analysis are three public sector institutions chosen due to their implementation of the ERP system.

Research findings confirm that ERP implementation conducted without BPM initiatives is used in the public sector to cement antiquated, less than optimal methods of data flow, documentation flow, decision flow and workflow. Research also shows that the adoption of ERP partially contributes to the launch of BPM initiatives in public sector institutions. This study has value for improving the efficiency and effectiveness of public sector organizations which are obligated to operate in a cost effective manner.

## Keywords

Business Process Management, BPM, Enterprise Resource Planning, ERP, public sector.

## Introduction

Frequently, Business Process Management (BPM) is indicated as the most important Critical Success Factor in the Enterprise Resource Planning (ERP) implementation (Ngai et al. 2008; Ram and Corkindale 2014). However, following the literature on BPM and ERP we found that, in principle, there are few studies that explicitly connect these two topics and explain their interdependencies. In addition, this low number of published studies that link ERP sources to BPM mainly discuss the ERP implementations in the private rather than the public sector (Velcu 2010; Yu 2005). This gap motivates our research and the main aim of our research in examining the role of BPM in the adoption of ERP systems in the public sector.

For a quarter of a century, BPM has been considered to be one of the main management approaches in improving the quality of products and services by systematically analyzing, optimizing, controlling and managing organizational processes (Elzinga et al. 1995). The alignment of the processes embedded in the logic of ERP within an organization's processes is often given as the basis for a successful implementation (Panayiotou et al. 2015; Velcu 2010).

An ERP implementation induced business process changes and encourages at least the partial use of BPM in the initial phases of a business process management lifecycle. Acknowledging that processes constitute the essence of integrated Information Technology (IT) management and support systems like ERP, it seems important to study *if* and what elements of BPM affect ERP implementation in practice.

For this study, in which we examine the importance of BPM for ERP adoption, we have chosen the public sector for two reasons. Firstly, and typically, BPM and ERP system implementation in the public sector requires greater organizational changes than in profit-focused organizations (Saxena 1996). Therefore, in the public sector, ERP implementation is a challenge, not only technologically, but also managerially. Secondly, we feel that public sector institutions should start regarding themselves as a business, and only then they can consider (Parr and Shanks 2000) the success of the integrated management system

implementation. For these reasons we expect that the impact of BPM on ERP adoption may be more visible and pronounced in public sector organizations than in the private sector.

The main research method we use is that of a multiple case study analysis. The units of analysis are three public sector institutions chosen due to their implementation of an ERP system and because of our assessment of the level of process orientation, which indicates the status of BPM in those organizations. In this paper we examine how BPM affects ERP adoption in each of three main phases of system adoption distinguished in the literature: in the planning of ERP and its implementation, and in the post-implementation phase (Parr and Shanks 2000; Themistocleous et al. 2011). The planning of ERP includes the selection of the system, decision about resources, and the selection of the implementation approach. The implementation of ERP is a project phase with system installation, tuning and testing, and training for employees. Post-implementation includes stabilization, usage and enhancement of the system. Consequently, the main question of our research is:

RQ: Is the existence of BPM conducive to the adoption of ERP in the public sector?

To answer this main research question we formulated three guiding questions:

RQ1: How does BPM affect the planning of ERP in a public sector organization?

RQ2: How does BPM affect the implementation of ERP in a public sector organization?

RQ3: How does BPM affect the post-implementation of ERP in a public sector organization?

Research results will specify the role of BPM in the ERP system adoption and deliver empirical insights about conditions for ensuring the success of this adoption. We believe this research to be highly valuable since ERP adoption in the public sector may substantially contribute to socioeconomic development. For example, on an individual level, citizens would have a less bureaucratic struggle with authorities and on a national level, the possibility of more efficient and effective authorities (Roztocki and Weistroffer 2016).

The paper is structured as follows: in the background section we present related work in the fields of BPM and ERP in the public sector, and the most commonly noted element in these areas, namely BPM as CSF for ERP adoption. After, we introduce our research methodology and propose an initial model. In the results section we relate the outcomes of the case study analyses to the three phases of the adoption of ERP. Finally, we discuss the limitations of our research and related plans for the future.

## **Background**

### ***BPM in the Public Sector***

New public management policies need methods and techniques adopted from private sector management that can be used in the public sector, and lead to an improved efficiency and performance in this sector, simultaneously promoting an outcome-based orientation and a citizens orientation (Pollitt and Bouckaert 2011). In the private sector, BPM in combination with ERP allows the efficient use of resources. Thus to increase efficiency, BPM could also be applied in the public sector. However, due to the differences in nature of the public and private sectors, both BPM and ERP implementations may differ from those in the private sector (Saxena 1996).

There are two primary benefits of BPM in the public sector. The first is to improve the performance of public sector organizations through cost reduction and the efficient use of resources, including IT systems supporting operations (Gabryelczyk and Rakowska 2015; Gullledge and Sommer 2002). The second benefit results from using BPM to achieve citizen-centric services that are cost-effective, and, as a result, increase the satisfaction of citizens (Niehaves et al. 2013; Stemberger et al. 2007; Weerakkody et al. 2011).

BPM in the public sector is unquestionably less studied than in the private sector as evidenced by the high paucity of literature on this topic. Houy et al. (2010), in an analysis of an emerging field of BPM research, shows that 93% of empirical research on BPM concerns the private sector, with merely 7% covering the public sector. Authors of this research expects increase in BPM empirical research concerning the public context. This rather limited literature focuses on constructing frameworks for BPM implementation (Helfert 2009; Niehaves et al. 2013; Stemberger et al. 2007) or business process modeling of organizational processes (Gabryelczyk and Rakowska 2015; Gullledge and Sommer 2002). The first of the indicated papers

concerns the modeling and measurement of ‘as-is’ and ‘to-be’ processes and demonstrates how the implementation of an ERP system can reduce the time and cost of processes and improve their quality. In other, albeit rare cases, BPM in the public sector, in the context of the implementation of ERP systems, occurs mainly as CSF (Zabjek et al. 2009; Ziemba and Oblak 2013).

### ***Adoption of ERP in the Public Sector***

There is a lack of published reports about ERP implementation in the public sector, and particularly striking that few papers concerning this topic have been published in recent years. One explanation for this scarcity of research could be explained through difficulties in obtaining the data.

In the public sector there are different motivations to implement ERP than in the private sector with many decisions being political in nature (Uwizeyemungu and Raymond 2005). It is therefore quite customary for many politicians and decision makers to shy away from disclosing information that they feel may damage their careers. Many reports of existing studies comparing public and private sectors (Alves et al. 2012) often conclude that unique situations in the public sector exist and that short term thinking and risk aversion are prevalent (Thomas and Jajodia 2004). In the public sector, the most cited motivations underlying the adoption of ERP systems are: technological (replacing old, unintegrated systems), operational (replacing systems with those supporting a process view), strategic (decision-making improvement, Y2K compliance), and financial performance (need for efficiencies, cost reduction) (Poba-Nzaou et al. 2014; Raymond et al. 2006).

Research on Information Technology adoption models in relation to ERP adoption in the public sector is virtually nonexistent (Oliveira and Martins, 2011). Two of the most frequently used theories for IT adoption at the organization level, DOI (Diffusion of Innovations)(Rogers 1995) and the TOE framework (Technology, Organization, and Environment) (Tornatzky and Fleischer 1990), largely refer to the private sector and internet technologies.

Referring to related literature, there is a consensus among researchers that BPM is supportive of ERP implementation (Ngai et al. 2008; Ram and Corkindale 2014). For example, Ziemba and Oblak (2013) examined ERP adoption in public administration and concluded that BPM supports ERP in various phases of the life cycle, and that BPM is an important CSF for ERP implementation. The success rate of ERP implementation is small and BPM is one of the three most important factors (besides top management support and a change in management) (Zabjek et al. 2009). Moreover, BPM is highly useful in management change (Al-Mudimigh 2007).

### **Methodology**

In this study, the main method we used was a multiple case study analysis considered the most suitable in examining contemporary events within real-life context and when “how” questions are being posed in research (Yin 2014). We used an exploratory qualitative study with the goal to develop pertinent hypotheses for future quantitative research of the phenomena (Yin 2014).

Our multiple case study was conducted in a four phased approach based on semi-structured interviews and an analysis of secondary data. In the first step, we compiled an initial list of 140 potential public sector institutions that met the initial fundamental criterion: an ERP system has been implemented. Organizations were selected from a client base of ERP vendors and marketing notices. Organizations were contacted by telephone or e-mail and asked if an ERP system had been adopted or the implementation was in the final phase. Therefore, we were able to complete a direct contact list to the 44 public sector institutions operating with the ERP system to which we sent a request for an interview. As a result, we received an answer from four institutions with one respondent scheduling their ERP system to go live in January 2017. In the other three public sector organizations we collected primary and secondary data in December 2016 and January 2017 in Poland.

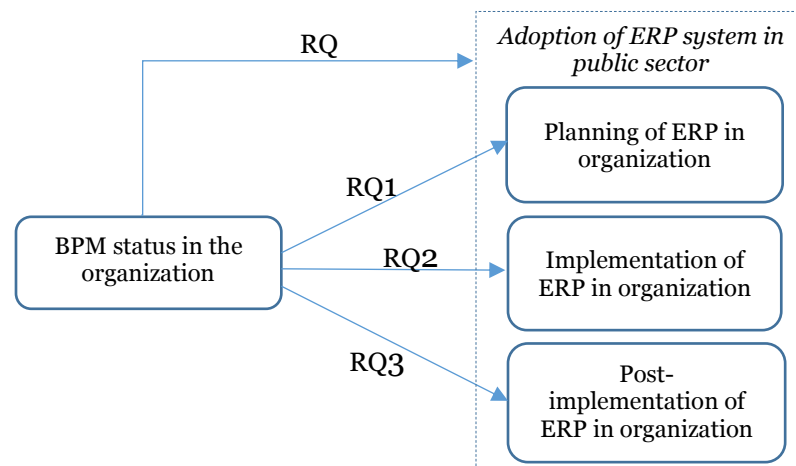
In the second step, we found employees in the selected organizations that were involved in the process of planning, implementation and use of their ERP systems as key-users, end-users, and IT-specialists. These are typical in ERP adoption with these common groups of ERP users giving us a picture of the implementation from different perspectives. The one perspective absent is that of external consultants,

being we are planning to add in the future research. For every organization we selected a representative of each group of respondents agreeing to be interviewed.

In the third step, we asked our respondents to fill out a checklist designed by Reijers (2006) to assess the current BPM status of investigated organizations. We needed to evaluate objectively to what extent the respondents are involved in the various process-focused initiatives. We found this approach, as preparation for an interview, to be more objective than the question about the self-assessment of BPM maturity, but also less complex than a formal research of the BPM maturity in accordance with recognized BPM maturity methods (Hernaes et al. 2016).

The checklist to determine the level of process orientation includes the sentences describing the functioning of the organization according to eight key variables that constitute the adoption of the process approach as the basis for BPM. These variables include: organizational structures, focus and language of communication inside an organization, documentation and utilization of processes, support of information systems by the execution and control of tasks, types of performance measures, process ownership, and customer requirements. (A detailed design of the check-list developed by Reijers (2006) with a literature justification and normalized scores is available in the source article). We have adapted the questions and a list of possible answers specifically for the public sector. The scoring system takes into account the weight for each variable and answers of respondents on a scale. Scores are classified into three colors determining the level of BPM status, i.e., red means no or very few BPM initiatives in an organization, yellow indicates that BPM initiatives occur in the organization, and green proves a high involvement in BPM.

In the fourth step of our research process, we conducted semi-structured interviews that were written and partially recorded for encoding. Some of the interviewees demanded final approval of the interview prior their use. The leading questions applied to three main phases of ERP adoption: the planning and implementation of ERP, and its post-implementation. Our respondents were asked about a retrospective look at the first two phases. The interview instrument includes questions concerning the tasks, methods and tools necessary in the subsequent phases of the adoption of the ERP system. Based on the coded responses we were looking for, we were able to update the conclusions of our research. Primary data, in the form of interviews, were supplemented with secondary data such as documents showing the concept of implementation, post-implementation reports, and public reports regarding IT strategy.



**Figure 1. Initial research model**

The proposed initial research model (Fig. 1) focuses on the three main phases of ERP adoption identified in our literature review. As a result of the aggregation of the results obtained for these phases we propose to explore how BPM supports the adoption of ERP in the public sector.

## Research Results

### Case Studies

The first organization chosen for our research is a public university with over 36,000 students, approx. 20 departments, and almost 500 professors. The implementation of their ERP system took place in 2011. The system was implemented in order to replace a number of solutions that were not integrated on a single integrated system (technological motivation). At the moment of research the investigated university had over 1,500 end-users of the ERP system and over 5,000 end-users with tightly restricted access using the system via web portal. Based on a checklist completed by our respondents, we assess the current BPM status of this organization as red indicating there is no BPM in this organization.

The second case in our study is a government agency operating in the sector of public finance with approximately 1,250 employees and 250 end-users of the ERP system. Although theirs is not a large unit, the ERP system is the oldest among the examined case studies. The direct cause for their implementation of ERP in 1999 was the fear of the Y2K millennium bug threat (strategic motivation). According to the checklist results, we assigned the yellow color, meaning that BPM initiatives occur in this organization.

The third case study is a department in a government ministry. This case concerns the most recent implementation of ERP among our examined cases, taking place in October 2015. The department employs approximately 15,000 officials, of which 1,100 are the end users of the system. The direct motivation for the system implementation was planned organizational changes that required an integrated and flexible system. Therefore, the expected changes prompted the need for a more powerful ERP system. This system was exclusively developed to address shortcomings in the old, unintegrated legacy system used in the ministry department, such as: significant resources needed to maintain the old system, lack of communication possibilities, difficulties in administering the old system, and its frequent overload (technological, strategic, financial performance motivations).

In the case of the public university and government agency, the same off-the-shelf ERP system from the same large vendor was implemented. This system was designed for large organizations with basic functionality customized to the specific needs of these organizations. In case of the department in the government ministry, a custom ERP system was developed by another large ERP vendor to meet their specific requirements. In this case, the motivations for adoption had the most varied reasoning. However, as in the other two cases, they did not include operational motivation such as the adoption of systems supporting a process view.

We are aware of the differences in the nature of public universities and government agencies. However, all organizations are units of the public finance sector and are characterized by the same features of public sector organizations, such as: more resistance to change than in the private sector, bureaucratic regulations, budget financing without pressure to enhance efficiency, lack of managerial freedom and motivational systems that do not encourage performance (Saxena 1996). For these reasons, we believe that our selected case studies are comparable and the results obtained can be a generalization of public sector organizations.

According to the second step described in our methodology, we carried out three interviews for case 1 and case 2, in each case with a representative of key-users, end-users, and IT-specialists. In the case 3 we were able to carry out just two interviews. Each interviewee (total eight people) was involved in the phase of planning, implementation, and post-implementation of the ERP system in their organization.

Table 1. presents the final results of the BPM status scores calculated using the methodology developed by Reijers (2006). The BPM status in red is in the range of 0-20%, yellow 21-65%, and in green 66-100%. This approach allowed us to conclude whether the level of advancement in BPM mattered in the support of ERP implementation. BPM status was not assessed retrospectively, but the present information also indirectly supports the existence of BPM development or the lack of BPM projects or programs within the organization.

Finally, based on the BPM status results, we have two cases from public administration assessed as *yellow*, and one case of a public university assessed as *red* with the lowest status of process orientation, almost on the border of a lack of BPM and small BPM initiatives (18%). The department in the government ministry, with an average score of 49%, is more involved in BPM initiatives than the government agency with a score

of 36%. These assessments were made objectively based on the checklist in addition to our findings from the interviews.

| Case study                         | Key-user     | End-user     | IT specialist | BPM status score |
|------------------------------------|--------------|--------------|---------------|------------------|
| Case 1:<br>Public University       | Red (17%)    | Yellow (21%) | Red (17%)     | Red (18%)        |
| Case 2:<br>Govt. Agency            | Yellow (37%) | Yellow (40%) | Yellow (30%)  | Yellow (36%)     |
| Case 3:<br>Dept. in Govt. Ministry | Yellow (48%) | Yellow (52%) | Yellow (48%)  | Yellow (49%)     |

**Table 1. BPM status scores using the checklist**

### ***BPM in the Planning of ERP in the Public Sector***

In the planning phase of ERP adoption, in the cases of public university and government agency, the decision about ERP selection was not based on formal documented business needs but on decisions of the authorities. In the government agency a system was chosen that was sizeable enough to leave no doubt as to its capacity to fulfill the functional requirements of the organization. The public university, before the decision on the choice of system, had maps of their main processes but these were not used even at the stage of developing the concept of implementation. Only in the case of the government ministry department there is an organizational unit formed responsible for creating the framework requirements for all new projects on the basis of the organization's goals, formally documented process architecture and process models. In this case, it was stated in the selection criteria of the system the necessity to migrate previously reengineered processes to the new system.

In case 1 and case 2 the required functionality of ERP corresponded mainly with the description of the functional areas previously supported by the non-integrated insular solutions. Following ERP implementation both organizations demanded the same conditions. In all cases a detailed implementation concept was generated by the interaction between the project team members from within the organization and software vendors and/or external consultants. In the government ministry department the implementation concept was likewise prepared using BPM tools and required modeling notations with the goals and metrics of the processes.

### ***BPM in the Implementation of ERP in the Public Sector***

Results in the implementation phase are derived from the results of the previous stage of adoption. In case 3 of the government ministry department, the entire documentation is based on the description of processes in the form of graphic models, which are regularly updated using common licenses for business process modeling software. In this case we observe a direct relationship between documentation processes and test scenarios – performers are assigned to each function in the process model so it is known immediately who should take part in the tests. Process documentation is also used in the preparation of training material for key-users and end-users. However, key and end-users of ERP do not directly use BPM tools, rather paper documentation developed using the said tools.

In the case of the government agency the implementation was conducted by a ERP vendor who imposed their methodology and ways of documenting. The external consultants involved had little time and their own goals and therefore did not offer anything beyond what was in the contract. Our interviewees emphasize that they perceived the significant potential in the ERP system, enabling some positive practices, but the lack of organizational change made it impossible to utilize such potential. In the first years after the implementation the ERP vendor used only the bare functions to replace the old insular solutions, likening the process to "*using a sledgehammer to crack a walnut*." The process approach was included in the logic of the ERP system; however, BPM was not used in the organization.

A similar situation occurred in the first case of the public university. Our respondents noted that the process maps, which were produced in the preparation stage of implementation, were not used in any way due to a

conflict between the external consultants and internal project team. However, these maps reflected the processes without reengineering and improvement. Even if they had been used, the ERP implementation has led only to the automation of tasks previously performed manually. Notably, resistance from administrative staff at the university made it impossible to make changes in the organization.

### ***BPM in the Post-Implementation of ERP in the Public Sector***

The main question in the post-implementation phase concerns an assessment of the success of ERP adoption. To our surprise, all respondents subjectively assessed the implementation as ultimately successful despite the difficult start. However, they all admitted the effectiveness of ERP implementation was not formally measured in their organizations. The processes were also not measured, but in all cases the respondents saw the benefits arising from their ERP implementation with, for example, fewer errors, more opportunities for data analysis and reporting. In the case of the department of the government ministry, the duration of processes that had once been carried out without the system was much shorter, most likely the result of an earlier reorganization. This organization also implemented a Management by Objectives (MBO) plan, which requires defining the goals of an organization, but not always the objectives of the processes. The implementation of the MBO was made possible by the ERP system as the system collects data to measure goals and strategy. It should be emphasized that the ERP in the department of the government ministry was implemented 18 months ago and is still undergoing development in the area of integration with other information systems.

In the case of the public university, almost seven years after the implementation of the system documents are printed from the system and stored in binders. The CIO states, "the organization has retained the paper mentality." A key-user gives an example of the process of settling a salary statement: before the implementation of ERP the process was carried out in seven rooms by seven positions - after the implementation the same operation became fully automated. However, to realize this process an employee still has to go to seven rooms.

The permanent adaptation of the system to the organization, regardless of economic efficiency, takes place in the government agency. Seventeen years after the ERP implementation the organization is slowly changing under the influence of the system. The process approach is not applied deliberately and processes are closed within functional departments. However, ERP implementation has forced the organization to use elements of BPM, to some extent. The integrated system allows employees on every level of an organization to understand the essence of the process approach. This allows people to not only see their own part in the processes but also a more holistic view of where it is possible for them to propose process improvements.

## **Discussion of the Research Results**

Due to the uniqueness of the public sector, goals and measurement systems of achievement, we cannot use the same criteria for assessing the success of ERP as those used in the private sector. The adoption of ERP is perceived as successful in all cases, but in the public university and government agency, this is due solely to the fact that the system still works and people are getting accustomed to it. The ERP system, to a very small extent, forced a change in these organizations due to its inherent logic. In the public university and government agency, using BPM was not necessary for the adoption of ERP, which is perceived as successful. However, based on the case of the government ministry department, we can conclude that using BPM generally supports economically efficient implementation of ERP and begins to integrate with other management systems in the said organization. Similar conclusions were drawn by Alves et al. (2012).

The first planning phase of the ERP adoption mainly concerns engineering and preliminary studies to select the appropriate approach to the implementation: process-driven or technology-driven (Arif et al. 2005; Christofi et al. 2013; Panayiotou et al. 2015). According to our case study results, we can conclude that in the planning phase, a process-driven approach was used only in the department of the government ministry. Based on reengineered processes, this approach has been chosen as the most appropriate for ERP (Arif et al. 2005). In other cases, we observed a hybrid approach in which ERP is adapted to an organization and organizational processes are adjusted to ERP functionality (Panayiotou et al. 2015).

The implementation phase covers the documentation, configuration, and technical set-up of the system. At this stage of adoption, user interface planning, final system tests, and end-user training and data migration also occurs (Gulledge and Simon, 2005) - the system starts to operate live. BPM can be added to all of these tasks, as confirmed by the case of the department of the government ministry. Judging by the results of the phase of post-implementation, we observe that in the case of the government agency early BPM initiatives are necessitated by the ERP system. We can therefore conclude that the ERP system partly contributes to the launch of BPM initiatives.

Our study confirms that ERP is used in many organizations in the public sector to cement antiquated, less than optimal methods of data flow, documentation flow, decision flow and workflow. In other words, our research confirms the observations of Hammer (1990) almost three decades ago relating to the use of computers solely to automate existing business processes. This presents a huge opportunity for the public sector to embrace the current concepts of BPM that are able to systematically analyze and optimize business processes as a suitable preparation for ERP adoption.

In summary, we present the imposition of BPM support during ERP adoption in the examined cases of the public sector, as depicted in Table 2.

|  |  |              |                |                     |
|--|--|--------------|----------------|---------------------|
| BPM support  | Case 1: Public University<br>(BPM status: Red)               | ○            | ○              | ○                   |
|  | Case 2: Government Agency<br>(BPM status: Yellow low)        | ○            | ○              | ◐                   |
|  | Case 3: Dept. in Govt. Ministry<br>(BPM status: Yellow high) | ◐            | ◐              | ◐                   |
| Legend:<br>○ weak support of BPM<br>◐ moderate support of BPM<br>● strong support of BPM |  | Planning     | Implementation | Post-implementation |
|  |  | ERP adoption |                |                     |
|  |  |              |                |                     |

**Table 2. Supporting forces of BPM in ERP adoption in the public sector**

Moreover, our research shows that an implementation of ERP partially imposes the use of BPM on public sector organizations. In addition, the public sector has different motivations and circumstances concerning the implementation of ERP, which include direction/directives from the top, recommendations from outside, and the lack of business goals. Many decisions are more political than economic and, in the public sector, ERP implementation, by default, should help to serve the citizen rather than profit generation. Therefore, despite a new management approach, there is frequently a lack of restructuring and issues in the information flow.

## Practical Implications and Contribution

Our research confirms that BPM, while certainly an important CSF for ERP in the private sector, is also an important CSF for the public sector, though is not necessary for ERP adoption. In particular, the presence of BMP elements is important when organizations in the public sector expect financial and internal process benefits, and benefits for customers (Velcu 2010). The motivation for employees to adapt to process thinking is mainly the search for improvements in their own productivity, which in turn contributes to the efficiency and effectiveness of the whole organization.

To the best of our knowledge, our research is the first study that involves both topics of BPM and ERP adoption in the context of the public sector. Moreover, the results of the three case studies may serve as recommendations for the public sector. An in-depth understanding of how BPM affects ERP adoption in each of the main phases would help to plan its implementation and better recognize organizational needs. This will help organizations to more easily select the system and formulate their expectations about the system to the vendors more clearly. This approach could improve the selection of both systems and their implementers.



We believe that our research presents a robust foundation for future research projects and presents not only a reasonable contribution to the existing theoretical body of knowledge but also has practical implications for performance enhancements in the public sector. To conclude, our research has evident value for improving the efficiency and effectiveness of public institutions that are obliged to operate in a cost effective manner, which in turn will benefit citizens.

## Limitations and Future Research

There are several limitations of this study, many of which may provide ideas for future research. For example, one limitation is the modest number of case studies. Therefore, ideally, a future research project would consider four to ten cases. In addition, the retrospective collection of data on the planning and implementation phases, in the context of implementation carried out many years ago, for example, may have some margin of error. Our study involved internal ERP users, with consultants from our side being uninvolved. Future research may, therefore, involve our ERP consultants. We should also include a broader study of the motivations for adopting ERP systems in the public sector and explore possible linkages to the use of BPM.

Furthermore, to extend conclusions, our research could be continued using mixed qualitative and quantitative methods that will give a fuller picture of the phenomena. We observe that theories such as DOI are not used to explain the ERP adoption in the public sector. Moreover, our work precludes the use of any theory. Therefore, in our future work, we plan to examine applicability of theories such as DOI or TOE.

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